Weather and Aviation

- Full spectrum of weather applications – situational awareness, short-term forecasting, data assimilation of atmospheric and cloud properties into NWP
- Aviation weather – convective weather, volcanic ash/SO2 impact, turbulence, icing, and, NWP data assimilation
- Impact of aviation on environment – climate role such as emissions and contrail development
- Highest impact in remote locations such as data void regions such as oceanic/mountainous/polar/oceanic regions (umbrellas all of above categories)

Goals and Objectives

- Observations to fill gaps in data sparse areas
- Enable early use of future operational satellite instrumentation
- Unique spectral, temporal, phenomenological, and spatial coverage
- High resolution research NASA satellite data can be used to independently develop, assess, and improve NWP, satellite decision support products, future operational GOES-R algorithms
- Synergy with other observations (Example: Convection - FAA CoSPA and Turbulence - GTG), satellite products are not stand alone

Information Needs

- Winds/shear, cloud properties (icing), volcanic ash/SO2, turbulence, lightning, thermodynamic state, convective overshooting-top/initiation, visibility, low clouds/fog

Observations that Address Information Needs

Observation Types

- Space, airborne, in situ measurements required for data and data products to be integrated with other observations and forecast systems

Spatial, temporal, spectral requirements

- High vertical resolution
- High spectral resolution
- High spatial resolution
- Rapid temporal refresh

All requirements vary with observation parameter

Traceability to NASA Missions Over the Next Decade

Near-term:

- **NPP/NPOESS – broad applications/high relevance – mulitispectral imager and hyperspectral sounding similar to MODIS and AIRS/AMSU capabilities --- KEY MISSION**
- **GPM – broad applications/high relevance – passive and active precipitation mapping with 3 hour coverage over globe --- KEY MISSION**
- LDCM – narrow applications/moderate relevance
- OCO – narrow applications/moderate relevance, surface pressure

Tier 1:

- CLARREO – limited (indirect), primarily used for cross calibration
- SMAP - indirect application through surface forcing in NWP initialization
- DESDyni – limited, possibly derived winds in coastal areas, sea ice (NWP influence)
- ICESAT2 – limited unless provides atmospheric profiles

Traceability to NASA Missions Over the Next Decade

Tier 2:

- ASCENDS - limited unless atmospheric profiles are derived
- HYSpiri - limited, volcanic ash (in testing)
- SWOT – indirect through model initialization
- GEOCAPE – direct applications to visibility, greater capability if it had thermal IR, aviation impacts on climate
- **ACE – broad applications/high relevance, vertical motion from Doppler radar, cloud microphysical and macrophysical properties (enhanced CloudSat/Calipso capabilities) --- KEY MISSION**

Data Distribution and Use

Data policy issues

- publically and freely available, no obstacles to having access to data

Archival, processing and distribution issue

- realtime (direct broadcast)/near-realtime data collection and distribution system to external users with data availability in user appropriate formats, reprocessing and long term archive of all data, product processing from real-time data stream as appropriate

Timeliness of data products

- Direct broadcast/readout capability for time critical observations strongly endorsed for relevance to weather and aviation decision support

Potential overlaps with other application areas

- Water resources, air quality, disasters, climate